

Roof Systems

John Ficarra
Engineering Graphics Instructor

Warwick Area Career and Technical Center

Introduction

- Purpose:** Introduce students to various roof styles and roof framing systems.
- Core Objective:** Enable students to plan, design, and draft a roof system for a residential home design.
- Objectives:** After completing this unit students will be able to:
- Identify and sketch ten different types of basic roof designs.
 - Describe the construction of a typical frame roof using terminology consistent with roof systems.
 - Explain the difference between conventional and truss framing methods.
 - Interpret information found on a rafter span chart.
 - Draw a roof system using typical roof slope or pitch.
- Estimated Time:** Class hours - 20

Standards

Industry Standards: AIA Graphical Standards
Rhode Island state building codes for residential construction (CABO)

New Standards Performance Standards:

- E1c.** The student reads and comprehends informational materials to develop understanding and expertise and produces written or oral work that:
- Restates or summarizes information;
 - Relates new information to prior knowledge and experience;
 - Extends ideas;
 - Makes connections to related topics or information
- E3a.** The student participates in one-to-one conferences with a teacher, paraprofessional, or adult volunteer, in which the student:
- Initiates new topics in addition to responding to adult-initiated topics;
 - Asks relevant questions;
 - Responds to questions with appropriate elaboration;
 - Uses language cues to indicate different levels of certainty or hypothesizing, e.g., "what if...," "very likely...," "I'm unsure whether..."
 - Confirms understanding by paraphrasing the adult's directions or suggestions.
- E3b.** The student participates in group meetings, in which the student:
- Displays appropriate turn-taking behaviors;
 - Actively solicits another person's comment or opinion;
 - Offers own opinion forcefully without dominating;
 - Responds appropriately to comments and questions;
 - Volunteers contributions and responds when directly solicited by teacher or discussion leader;
 - Gives reasons in support of opinions expressed;
 - Clarifies, illustrates, or expands on a response when asked to do so; asks classmates for similar expansions;
 - Employs a group decision-making technique such as brainstorming or a problem-solving sequence (e.g., recognize problem, define problem, identify possible solutions, select optimal solution, implement solution, evaluate solution);
 - Divides labor to achieve the overall group goal efficiently.
- M2a.** Models situations geometrically to formulate and solve problems.
- M2i.** Compares slope (rise over run) and angle of elevation as measures of steepness.

- M6e.** Makes and uses rough sketches, schematic diagrams, or precise scale diagrams to enhance a solution.
- S6d.** Acquires information from multiple sources, such as print, the Internet, computer data bases, and experimentation
- A1a.** The student designs and creates a product, service, or system to meet an identified need; that is, the student:
- Develops a design proposal (the statement has been shortened);
 - Plans and implements the steps needed to create the product, service, or system;
 - Makes adjustments as needed to conform with specified standards or regulations regarding quality or safety;
 - Evaluates the product, service, or system in terms of the criteria established in the design proposal. (This statement has been modified).
- A2a.** The student makes an oral presentation of project plans or findings to an audience with expertise in the relevant subject matter; that is, the student:
- Organizes the presentation in a logical way appropriate to its purpose;
 - Adjusts the style of presentation to suit its purpose and audience;
 - Speaks clearly and presents confidently;
 - Responds appropriately to questions from the audience;
 - Evaluates the effectiveness of the presentation and identifies appropriate revisions for a future presentation.
- A3a.** The student gathers information to assist in completing project work; that is, the student:
- Identifies potential sources of information to assist in completing the project;
 - Uses appropriate techniques to collect the information, e.g., considers sampling issues in conducting a survey;
 - Interprets and analyzes the information
 - Evaluates the information in terms of completeness, relevance, and validity;
 - Shows evidence of research in the completed project.
- A3b.** The student uses on-line sources to exchange information for specific purposes; that is, the student:
- Uses E-mail to correspond with peers and specialists in the subject matter of their projects;
 - Incorporates into E-mail correspondence data of different file types and applications

ITEA Standards:

- 1J.** The nature and development of technological knowledge and processes are functions of the setting.

- 1L.** Inventions and innovation are the results of specific, goal-directed research.
- 2AA.** Requirements involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.
- 7G.** Most technological development has been evolutionary, the result of a series of refinements to a basic invention.
- 8H.** The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, communicating processes and results.
- 8I.** Design problems are seldom presented in a clearly defined form.
- 9J.** Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
- 13J.** Collect information and evaluate its quality.

Rubric

[1. Modify rubric template as desired. 2. Rubric should address standards listed on Standards page. 3. Include additional rubrics if necessary]

Scale/Criteria	needs to work substantively in this area in order to meet the standard 1	shows progress toward the standard 2	meets the standard 3	exceeds the standard 4
Concept	Demonstrates little understanding of topic concepts; requires substantial help in completing the assignment.	Demonstrates some understanding of the topic concepts; requires help in completing the assignment.	Demonstrates sufficient understanding of topic concepts to complete the assignment; requires minimal help.	Demonstrates clear understanding of topic content; solves problems independently; helps others in completing assignment.
Technical Knowledge	Contains some of the requested requirements; assignment is late due to being off task; many mistakes and inaccuracies.	Contains most of the requested requirements; inefficient use of time delays assignment; displays some mistakes and inaccuracies.	Contains all of the requested requirements; work is performed in a timely efficient manner; minimal or no mistakes or inaccuracies.	Contains all the requested requirements; work is performed in a manner that demonstrates advanced knowledge of both software and assignment content; high level of accuracy achieved.
Background Knowledge	Demonstrates very little understanding of previously learned material; constant reinforcement required; drawing review results in multiple redraws.	Demonstrates some understanding of previously learned material; some reinforcement required; drawing review results in a redraw.	Demonstrates sufficient understanding of previously learned material; little reinforcement required; no redraw required after drawing review.	Demonstrates clear understanding of previously learned material; no reinforcement required; no redraw required after drawing review; helps others by reinforcing previous lessons.
Presentation	Graphics are difficult to read; inconsistencies exist within the drawing; visually unappealing.	Graphics are somewhat neatly presented; use of colors, fonts, and LWT creates confusion; drawing is somewhat visually appealing.	Graphics are neatly presented; use of colors, fonts, and LWT adequate to produce a visually appealing drawing.	Graphics are presented in a professional manner; use of colors, fonts, and LWT add clarity; drawing is visually appealing conforming to the industry standards..

Core Learning Experience Summary Chart

Student Tasks & Instructional Methodology for Each Learning Experience		
Student Learning Experiences	Student Tasks	Instructional Methodologies
Introduction to roof design	<ul style="list-style-type: none"> Note taking during lecture Through question and answering, teacher and students will exchange ideas relating to students personal observations. Complete display board assignment Presentation of display board 	<ul style="list-style-type: none"> Lecture Teacher serves as facilitator and content expert. Student applies previously learned knowledge to design effort
Introduction to traditional frame roof construction	<ul style="list-style-type: none"> Note taking during lecture Use span charts to specify rafter and joist size requirements for students individual design project Construct a ceiling rafter and joist layout Construct an appropriate soffit detail Write to several manufacturers and ask for specifications and descriptive literature 	<ul style="list-style-type: none"> Lecture Teacher serves as facilitator and content expert. Student applies previously learned knowledge to design effort
Introduction to roof truss construction	<ul style="list-style-type: none"> Note taking during lecture Select appropriate truss design and correctly size to suit individual house design Construct layouts using various truss designs Construct an appropriate soffit detail Write to several manufacturers and ask for specifications and descriptive literature 	<ul style="list-style-type: none"> Lecture Teacher serves as facilitator and content expert. Student applies previously learned knowledge to design effort

Description of Core Assessment: product & performance
<p>Background: The students are creating a complete plan set for a house of their design. At this point, they have developed the foundation plan and floor plans and are now adding the next component.</p> <p>Students will select a roof style that will complement their individual house design.</p> <ul style="list-style-type: none"> Aesthetics, as well as roofing materials shall be considerations as the students select a roof style that will complement their design. <p>Students will decide between truss and conventional roof framing methods and draft the roof-framing plan.</p> <ul style="list-style-type: none"> Framing plan will include all necessary information, including dimensions, details, and notes. Framing plan will added to existing plan set.

Student Learning Experience 1

Purpose: Introduce students to roof designs

Estimated Time: 2 hours

Standards:

- E1c
- A2a
- A3a
- S6d
- 1J
- 1L
- 7G

Key Concepts Addressed:

- Basic roof designs
- Terms related to roof styles

Student Tasks:

- Note taking during lecture
- Teacher and students will exchange ideas relating to students personal observations
- Working in teams, students will cut out and organize pictures of houses that represent various roof styles. Pictures will be mounted on illustration board for presentation and display.

Explanation of how learning tasks require higher-level thinking:

- Students will communicate personal observations as it relates to new information being presented. (i.e. what is the roof style of their home?)
- Students will read, comprehend, and apply informational material from handouts, reference text, and industry journals in creating a display.
- Students will present their displays to the class.

Teacher Responsibilities:

- Introduce terms and concepts related to roof styles
- Involve the students in discussions of types of roof designs and the criteria for choosing a particular style

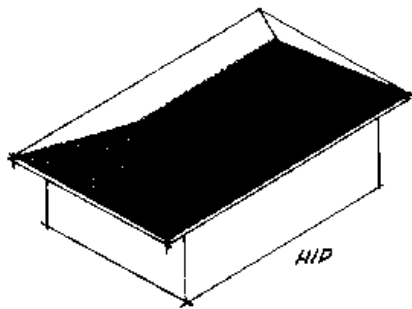
Materials & Equipment:

- Common residential roof types handout

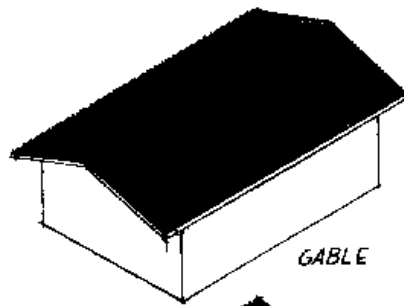
Resources:

Architecture textbook
Magazines, real estate listings and periodicals

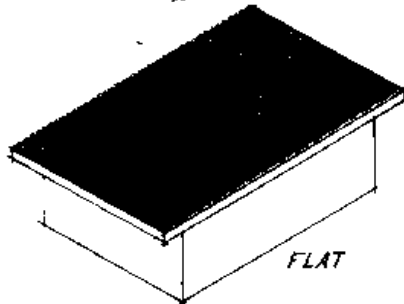
Student Learning Experience 1
Roof Style Handout



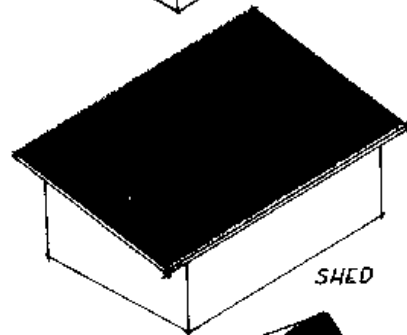
HIP



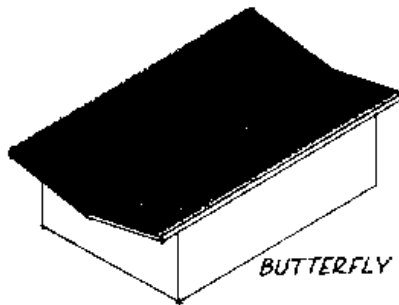
GABLE



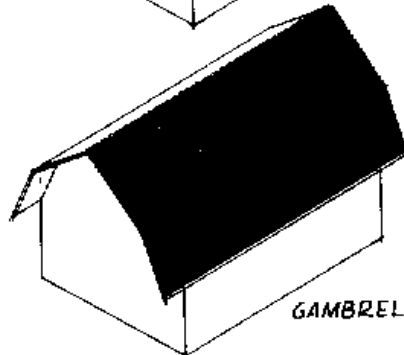
FLAT



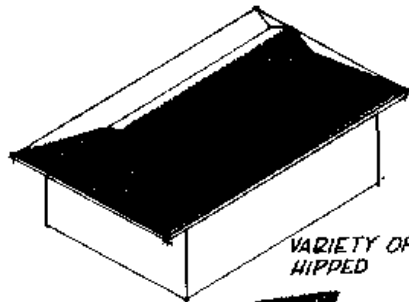
SHED



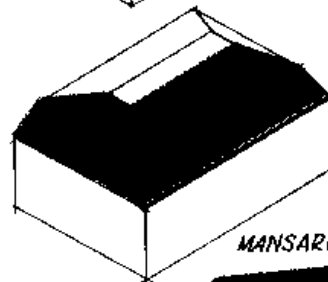
BUTTERFLY



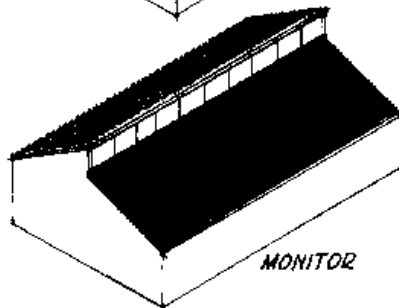
GAMBREL



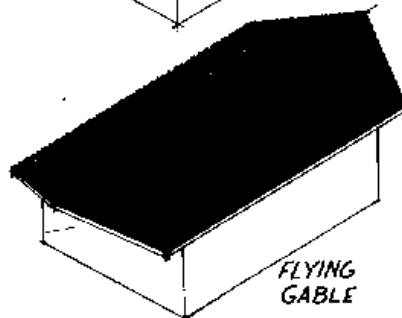
VARIETY OF
HIPPED



MANSARD



MONITOR



FLYING
GABLE

Student Learning Experience 2

Purpose: Introduce students to traditional frame roof construction

Estimated Time: 4 hours

Standards:

- | | | | | |
|-------|-------|-------|-------|-------|
| • E1c | • M2i | • A3b | • 1J | • 9J |
| • E3a | • M6e | • S6d | • 1L | • 13J |
| • E3b | • A1a | | • 2AA | |
| • M2a | • A3a | | • 8H | |

Key Concepts Addressed:

- Terms and construction techniques consistent with traditional roof framing, including pitch, slope, rise, and run.
- Interpretation of span charts

Student Tasks:

- Note taking during lecture
- Apply the information obtained from class discussions and span charts to specify the rafter and joist size requirements for the students individual design project
- Construct a ceiling rafter and joist layout for the students individual house design
- Construct an appropriate soffit detail
- Write (email) to several manufacturers of roof materials and ask for specifications and descriptive literature about their products

Explanation of how learning tasks require higher-level thinking:

Students will interpret and apply data obtained from span charts to meet the roofing needs of their individual design. This information will form the basis of a joist and rafter layout to support the design effort.

Teacher Responsibilities:

- Description of roof framing techniques and terminology
- Instruction on the interpretation and application of span chart data

Materials & Equipment:

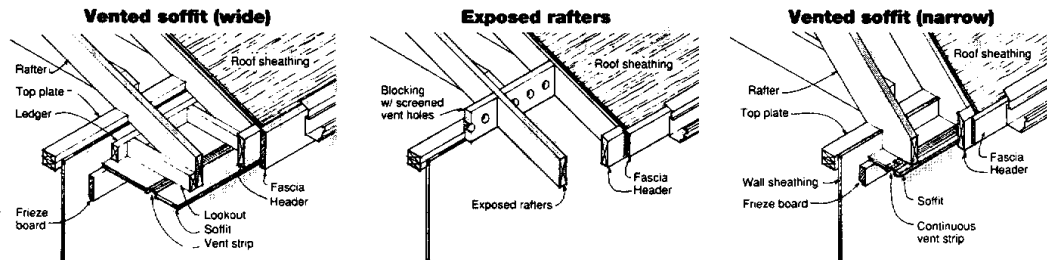
- Span charts for framing lumber handout
- Sample roof framing details
- Student developed floor plan

Resources: Architecture textbook, Architectural Graphics Standard
Manufacturers specification literature

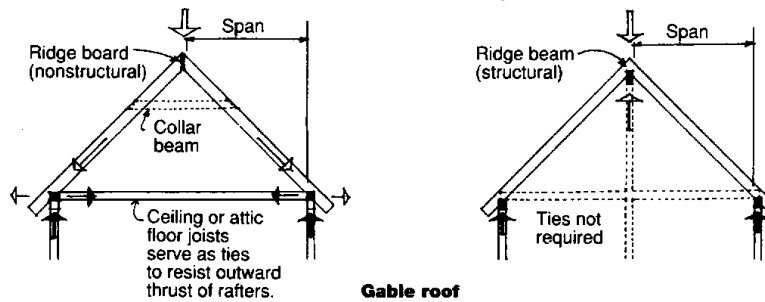
Student Learning Experience 2 Handout 1

Roof Designs 361

Rafter Framing Details

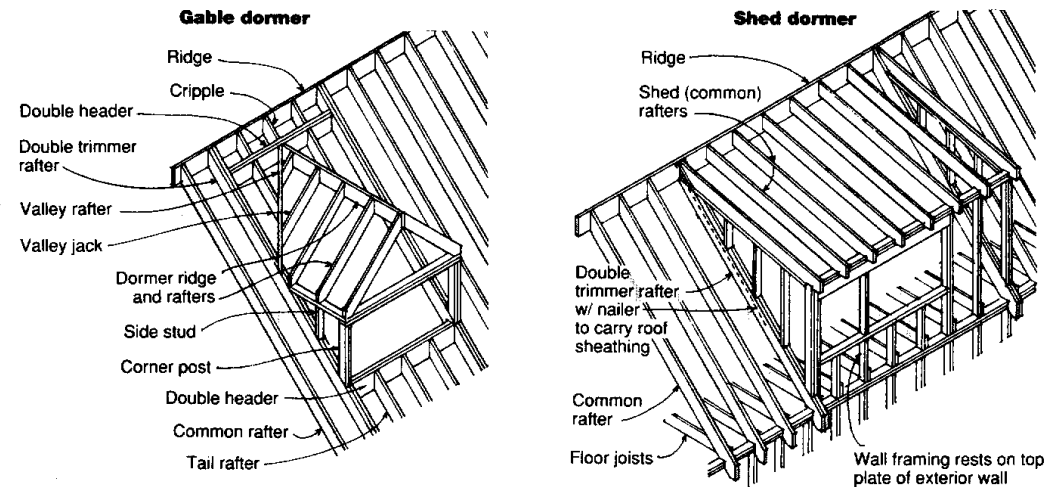


Rafter roof forms



Gable roof

Typical roof framing types are shown in the figures above. The arrows show the flow of force on the roof framing members.



Gable end wall of dormer may also be directly above and be an extension of the exterior wall as illustrated with the shed dormer.

Dormers are framed into the roof system to add style to the roof and provide light for the attic space or upper floor living area.

Student Learning Experience 2 Handout 2

362 Architecture Teacher's Resource Binder

Rafter Spans for Western Woods

ROOF RAFTERS

20# Live Load, 15# Dead Load, l/240

No snow load.¹

Roof slope greater than 3 in 12.

Heavy roof covering. No ceiling finish.

No snow load.

Light roof covering.

Flat roof or cathedral ceiling with drywall finish.

Table RR-4

Species or Group		Grade	Span (feet and inches)											
			2 x 6			2 x 8			2 x 10			2 x 12		
			12" oc	16" oc	24" oc	12" oc	16" oc	24" oc	12" oc	16" oc	24" oc	12" oc	16" oc	24" oc
Douglas Fir- Larch	Sel. Struc.	16-4	14-11	13-0	21-7	19-7	17-2	27-6	25-0	21-7	33-6	30-5	25-1	
	No. 1 & Btr.	16-1	14-7	12-5	21-2	19-3	15-9	27-1	23-7	19-3	31-7	27-4	22-4	
	No. 1	15-9	14-3	11-7	20-9	18-0	14-8	25-5	22-0	17-11	29-5	25-6	20-10	
	No. 2	15-4	13-3	10-10	19-5	16-10	13-9	23-9	20-7	16-9	27-6	23-10	19-6	
	No. 3	11-7	10-1	8-2	14-8	12-9	10-5	17-11	15-7	12-8	20-10	18-0	14-9	
Douglas Fir- South	Sel. Struc.	14-9	13-5	11-9	19-6	17-9	15-6	24-10	22-7	19-9	30-3	27-6	23-9	
	No. 1	14-5	13-1	11-0	19-0	17-1	13-11	24-1	20-10	17-0	27-11	24-2	19-9	
	No. 2	14-1	12-9	10-6	18-6	16-4	13-4	23-1	20-0	16-4	26-9	23-2	18-11	
	No. 3	11-4	9-10	8-0	14-4	12-5	10-2	17-6	15-2	12-4	20-3	17-7	14-4	
Hem-Fir	Sel. Struc.	15-6	14-1	12-3	20-5	18-6	16-2	26-0	23-8	20-8	31-8	28-9	24-8	
	No. 1 & Btr.	15-2	13-9	11-11	19-11	18-2	15-1	25-5	22-6	18-5	30-2	26-1	21-4	
	No. 1	15-2	13-9	11-4	19-11	17-6	14-4	24-9	21-5	17-6	28-8	24-10	20-3	
	No. 2	14-5	13-1	10-8	19-0	16-7	13-7	23-5	20-3	16-7	27-2	23-6	19-2	
	No. 3	11-7	10-1	8-2	14-8	12-9	10-5	17-11	15-7	12-8	20-10	18-0	14-9	
Spruce-Pine-Fir (South)	Sel. Struc.	14-5	13-1	11-5	19-0	17-3	15-1	24-3	22-1	19-3	29-6	26-10	23-5	
	No. 1	14-1	12-9	10-8	18-6	16-7	13-7	23-5	20-3	16-7	27-2	23-6	19-2	
	No. 2	13-8	12-4	10-1	18-0	15-7	12-9	22-0	19-0	15-7	25-6	22-1	18-0	
	No. 3	10-8	9-3	7-7	13-7	11-9	9-7	16-7	14-4	11-8	19-2	16-7	13-7	
Western Woods	Sel. Struc.	14-1	12-9	10-10	18-6	16-10	13-9	23-8	20-7	16-9	27-6	23-10	19-6	
	No. 1	13-3	11-5	9-4	16-9	14-6	11-10	20-6	17-9	14-6	23-9	20-7	16-9	
	No. 2	13-3	11-5	9-4	16-9	14-6	11-10	20-6	17-9	14-6	23-9	20-7	16-9	
	No. 3	10-1	8-8	7-1	12-9	11-0	9-0	15-7	13-6	11-0	18-0	15-7	12-9	

¹ A 1.25 Duration of Load adjustment has been applied.

ROOF RAFTERS

30# Snow Load, 10# Dead Load, l/240

Roof slope 3 in 12 or less.

Light roof covering.

No ceiling finish.

Table RR-10

Species or Group		Grade	Span (feet and inches)											
			2 x 6			2 x 8			2 x 10			2 x 12		
			12" oc	16" oc	24" oc	12" oc	16" oc	24" oc	12" oc	16" oc	24" oc	12" oc	16" oc	24" oc
Douglas Fir- Larch	Sel. Struc.	14-4	13-0	11-4	18-10	17-2	15-0	24-1	21-10	19-1	29-3	26-7	22-2	
	No. 1 & Btr.	14-1	12-9	11-2	18-6	16-10	14-2	23-8	21-2	17-3	28-4	24-6	20-0	
	No. 1	13-9	12-6	10-5	18-2	16-2	13-2	22-9	19-9	16-1	26-5	22-10	18-8	
	No. 2	13-6	11-11	9-9	17-5	15-1	12-4	21-4	18-5	15-1	24-8	21-5	17-6	
	No. 3	10-5	9-0	7-4	13-2	11-5	9-4	16-1	13-11	11-5	18-8	16-2	13-2	
Douglas Fir- South	Sel. Struc.	12-11	11-9	10-3	17-0	15-6	13-6	21-9	19-9	17-3	26-5	24-0	21-0	
	No. 1	12-7	11-5	9-10	16-7	15-1	12-6	21-2	18-9	15-3	25-1	21-8	17-9	
	No. 2	12-3	11-2	9-5	16-2	14-8	12-0	20-8	17-11	14-8	24-0	20-9	17-0	
	No. 3	10-2	8-9	7-2	12-10	11-2	9-1	15-8	13-7	11-1	18-2	15-9	12-10	
Hem-Fir	Sel. Struc.	13-6	12-3	10-9	17-10	16-2	14-2	22-9	20-8	18-0	27-8	25-1	21-11	
	No. 1 & Btr.	13-3	12-0	10-6	17-5	15-10	13-6	22-3	20-2	16-6	27-1	23-5	19-2	
	No. 1	13-3	12-0	10-2	17-5	15-9	12-10	22-2	19-3	15-8	25-9	22-3	18-2	
	No. 2	12-7	11-5	9-7	16-7	14-11	12-2	21-0	18-2	14-10	24-4	21-1	17-3	
	No. 3	10-5	9-0	7-4	13-2	11-5	9-4	16-1	13-11	11-5	18-8	16-2	13-2	
Spruce-Pine-Fir (South)	Sel. Struc.	12-7	11-5	10-0	16-7	15-1	13-2	21-2	19-3	16-10	25-9	23-5	20-6	
	No. 1	12-3	11-2	9-7	16-2	14-8	12-2	20-8	18-2	14-10	24-4	21-1	17-3	
	No. 2	11-11	10-10	9-0	15-9	14-0	11-5	19-9	17-1	13-11	22-10	19-10	16-2	
	No. 3	9-7	8-4	6-9	12-2	10-6	8-7	14-10	12-10	10-6	17-3	14-11	12-2	
Western Woods	Sel. Struc.	12-3	11-2	9-9	16-2	14-8	12-4	20-8	18-5	15-1	24-8	21-5	17-6	
	No. 1	11-10	10-3	8-5	15-0	13-0	10-8	18-4	15-11	13-0	21-3	18-5	15-1	
	No. 2	11-7	10-3	8-5	15-0	13-0	10-8	18-4	15-11	13-0	21-3	18-5	15-1	
	No. 3	9-0	7-10	6-4	11-5	9-11	8-1	13-11	12-1	9-10	16-2	14-0	11-5	



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Source: Western Wood Products Association

Handout 17-2

Student Learning Experience 2 Handout 3

Roof Designs 363

Rafter Spans for Southern Spans

Table 14 Rafters – 20 psf live load, 15 psf dead load, $\ell/240$, $C_D=1.15$

Medium roofing; Drywall ceiling; Snow load

Size inches	Spacing inches on center	Grade									
		Dense Select Structural	Select Structural	NonDense Select Structural	No. 1 Dense	No. 1 NonDense	No. 1 NonDense	No. 2 Dense	No. 2 NonDense	No. 2 NonDense	No. 3
2 x 6	12	16-4	16-1	15-9	16-1	15-9	15-6	15-9	15-5	14-9	11-11
	16	14-11	14-7	14-4	14-7	14-4	14-1	14-4	13-4	12-10	10-4
	24	13-0	12-9	12-6	12-9	12-6	11-11	11-9	10-11	10-6	8-5
2 x 8	12	21-7	21-2	20-10	21-2	20-10	20-5	20-10	19-11	19-1	15-3
	16	19-7	19-3	18-11	19-3	18-11	18-4	18-8	17-3	16-6	13-2
	24	17-2	16-10	16-6	16-6	15-9	15-0	15-3	14-1	13-6	10-9
2 x 10	12	26-0*	26-0*	26-0*	26-0*	26-0*	25-5	25-5	23-10	22-8	18-0
	16	25-0	24-7	24-1	24-3	22-11	22-1	22-1	20-7	19-7	15-7
	24	21-10	21-6	21-1	19-9	18-9	18-0	18-0	16-10	16-0	12-9
2 x 12	12	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	21-5
	16	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	24-2	23-2	18-6
	24	26-0*	26-0*	25-7	23-3	22-4	21-5	21-5	19-9	18-11	15-2

Table 11 Rafters – 30 psf live load, 10 psf dead load, $\ell/240$, $C_D=1.15$

Light roofing; Drywall ceiling; Snow load

Size inches	Spacing inches on center	Grade									
		Dense Select Structural	Select Structural	NonDense Select Structural	No. 1 Dense	No. 1 NonDense	No. 1 NonDense	No. 2 Dense	No. 2 NonDense	No. 2 NonDense	No. 3
2 x 6	12	14-4	14-1	13-9	14-1	13-9	13-6	13-9	13-6	12-11	11-2
	16	13-0	12-9	12-6	12-9	12-6	12-3	12-6	12-3	11-9	9-8
	24	11-4	11-2	10-11	11-2	10-11	10-9	10-11	10-2	9-9	7-11
2 x 8	12	18-10	18-6	18-2	18-6	18-2	17-10	18-2	17-10	17-0	14-3
	16	17-2	16-10	16-6	16-10	16-6	16-2	16-6	16-2	15-5	12-4
	24	15-0	14-8	14-5	14-8	14-5	14-0	14-3	13-2	12-7	10-1
2 x 10	12	24-1	23-8	23-2	23-8	23-2	22-9	23-2	22-3	21-2	16-10
	16	21-10	21-6	21-1	21-6	21-1	20-7	20-7	19-3	18-4	14-7
	24	19-1	18-9	18-5	18-6	17-6	16-10	16-10	15-9	15-0	11-11
2 x 12	12	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	26-0*	25-1	20-0
	16	26-0*	26-0*	25-7	26-0*	25-7	24-6	24-6	22-7	21-8	17-4
	24	23-3	22-10	22-5	21-9	20-10	20-0	20-0	18-5	17-9	14-2

These spans are based on the 1993 AFPA (formerly NFPA) Span Tables for Joists and Rafters and the 1991 SPIB Grading Rules. They are intended for use in covered structures or where the moisture content in use does not exceed 19 percent for an extended period of time. Loading conditions are expressed in psf (pounds per square foot). Deflection is limited to span in inches divided by 240 and is based on live load only. The load duration factor, C_D , is 1.15 for snow loads. Check sources of supply for availability of lumber in lengths greater than 20'-0".

*The listed maximum span has been limited to 26'-0" based on material availability.

These grades are the most commonly available.



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Source: Southern Pine Marketing Council

Handout 17-3

Student Learning Experience 2 Handout 4

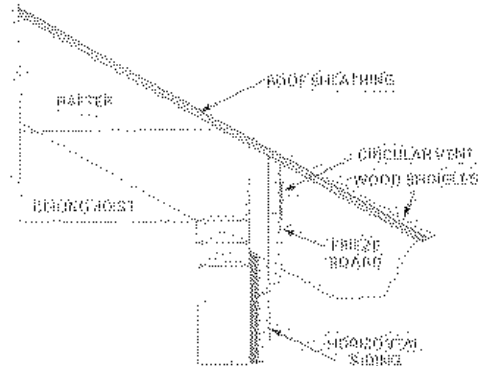


Fig. 17-14. Section through an open cornice.

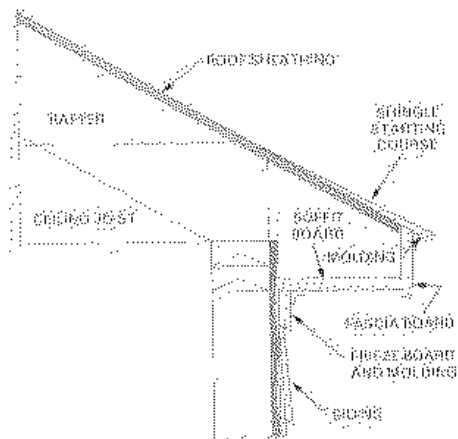


Fig. 17-15. Section through a narrow box cornice.

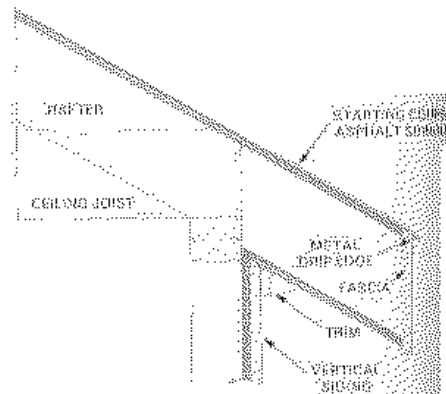


Fig. 17-17. A section of a wide box cornice without lookouts.

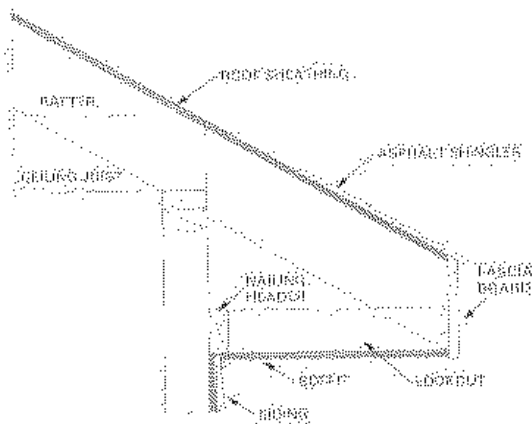


Fig. 17-16. A wide box cornice with lookouts.

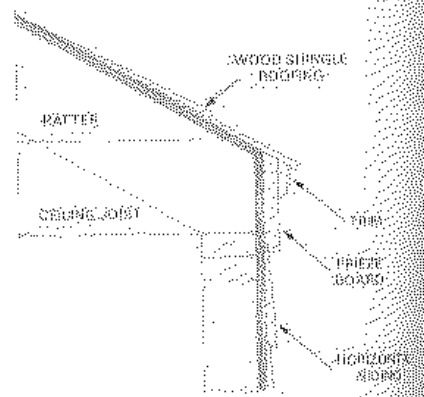


Fig. 17-18. A typical close cornice.

Student Learning Experience 3

Purpose: Introduce students to roof truss construction.

Estimated Time: 4 hours.

Standards:

- | | | | | |
|-------|-------|-------|-------|-------|
| • E1c | • M2i | • A3b | • 1J | • 9J |
| • E3a | • M6e | • S6d | • 1L | • 13J |
| • E3b | • A1a | | • 2AA | |
| • M2a | • A3a | | • 8H | |

Key Concepts Addressed:

- Common roof truss designs
- Advantages and disadvantages of framing lumber vs. trusses
- Interpretation of span charts
- Application to students individual house design

Student Tasks:

- Note taking during lecture
- Select an appropriate truss design and correctly size it to suit their individual house design.
- Construct a layout using four different truss designs as outlined by the instructor
- Construct an appropriate soffit detail
- Write (email) to several truss manufacturers and ask for specifications and descriptive literature about their products

Explanation of how learning tasks require higher-level thinking:

Students will interpret and apply data obtained from span charts to meet the roofing needs of their individual design. This information will form the basis of a series of truss layouts to support the design effort.

Teacher Responsibilities:

- Description of truss terminology
- Instruction on the interpretation and application of span chart data
- Initiate discussion on the criteria used to select trusses or conventional roof framing methods for particular applications


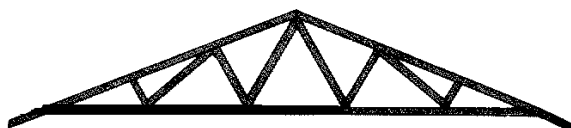
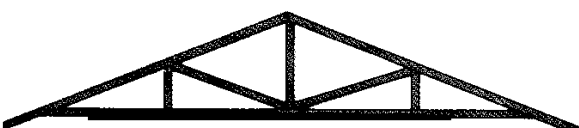
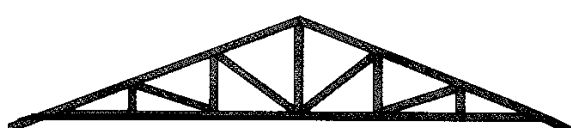

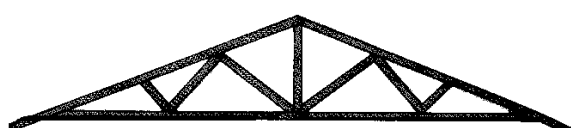

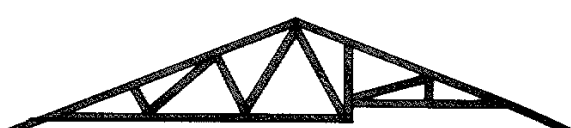


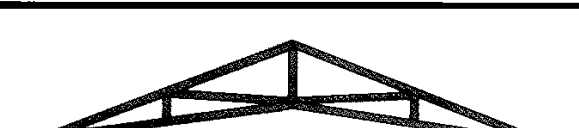
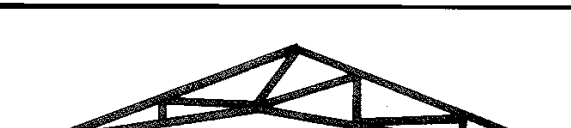


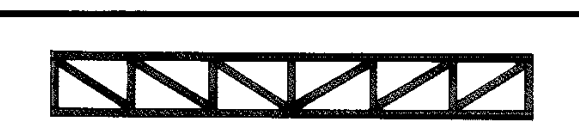



Materials & Equipment:

- Span charts for trusses handout
- Student developed floor plan

Resources: Architecture Textbook, Manufacturers specification literature

Student Learning Experience 3 Handout 1

REPRESENTATIVE TRUSS CONFIGURATIONS

 FINK	 DOUBLE W
 HOWE	 DOUBLE HOWE
 KING POST	 MODIFIED QUEEN POST
 DUAL PITCH	 STEP TRUSS
 HIP TRUSS	 MONO PITCH
 SCISSORS	 MODIFIED SCISSORS
 INVERTED	 STUB END
 FLAT	 PIGGY BACK
 FLOOR TRUSS—Bottom Chord Bearing	 FLOOR TRUSS—Top Chord Bearing

NOTE: The number of webs and web configurations can vary from those shown.

Fig. 17-20. Common roof truss designs used in residential construction.

Student Learning Experience 3 Handout 2

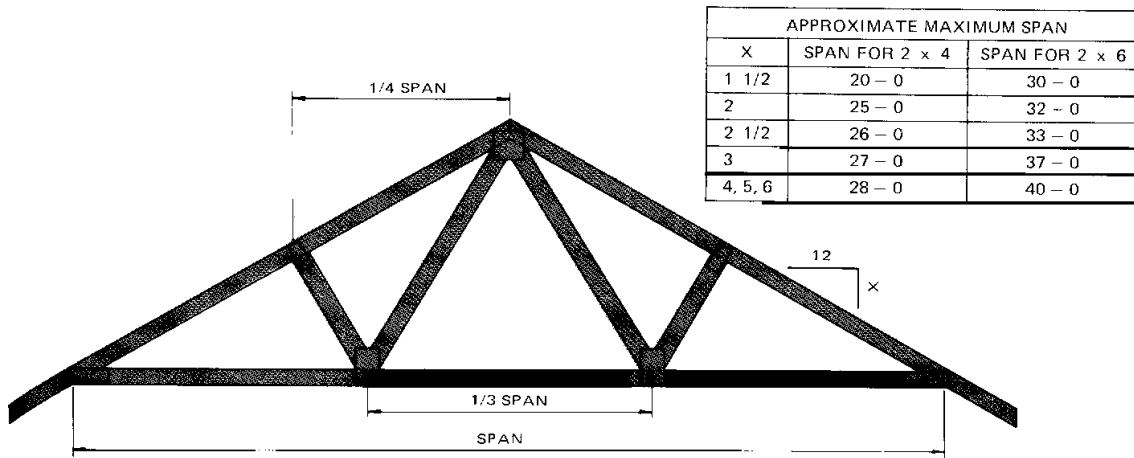


Fig. 17-21. Design data for a W-type truss.

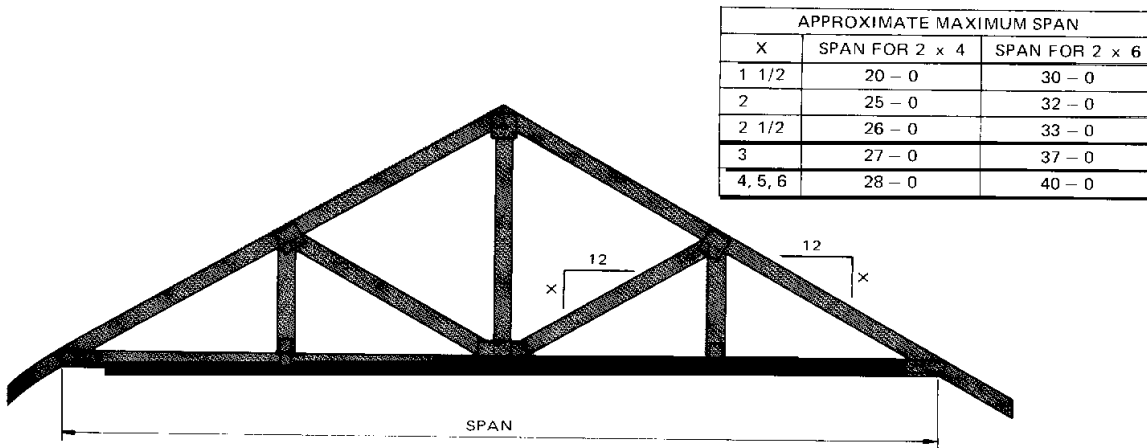


Fig. 17-22. Design data for a K-post truss.

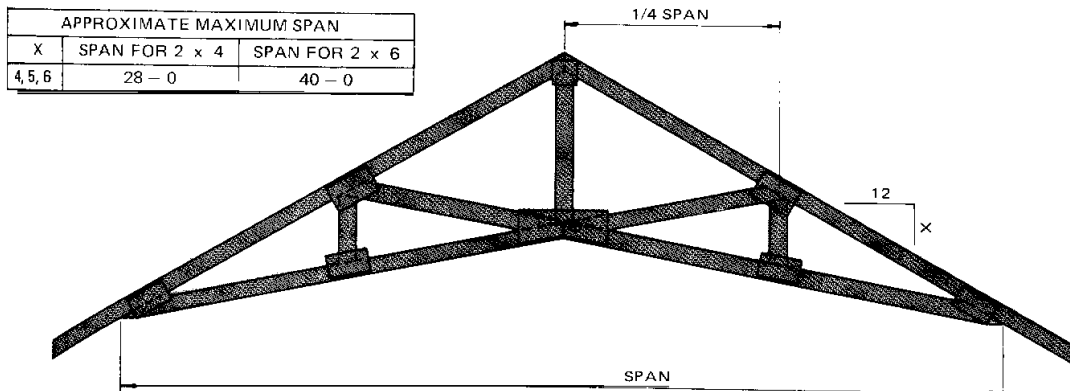


Fig. 17-23. Design data for a scissors truss.

Core Assessment

Estimated Time: 1 week

Student Tasks (product and performance):

- Students will select a roof style for their individual house design using information obtained from research and class discussions
- Students will select the roof construction method (trusses or conventional roof framing) best suited for their design and draft a roof-framing plan.
- The framing plan will include framing and soffit details.

Explanation of How Assessment Tasks Require Higher Level Thinking:

Students will apply previously learned abstract knowledge to a real life design problem. Students must apply creativity and engineering concepts to draft a roof framing plan for their individual house design.

Teacher's Responsibilities:

- Review design considerations with students
- Act as content expert
- Oversee design efforts

Materials & Equipment:

Handouts distributed during unit instruction

Resources:

Architecture textbook
Architectural Graphics Standards
Architectural magazines and periodicals